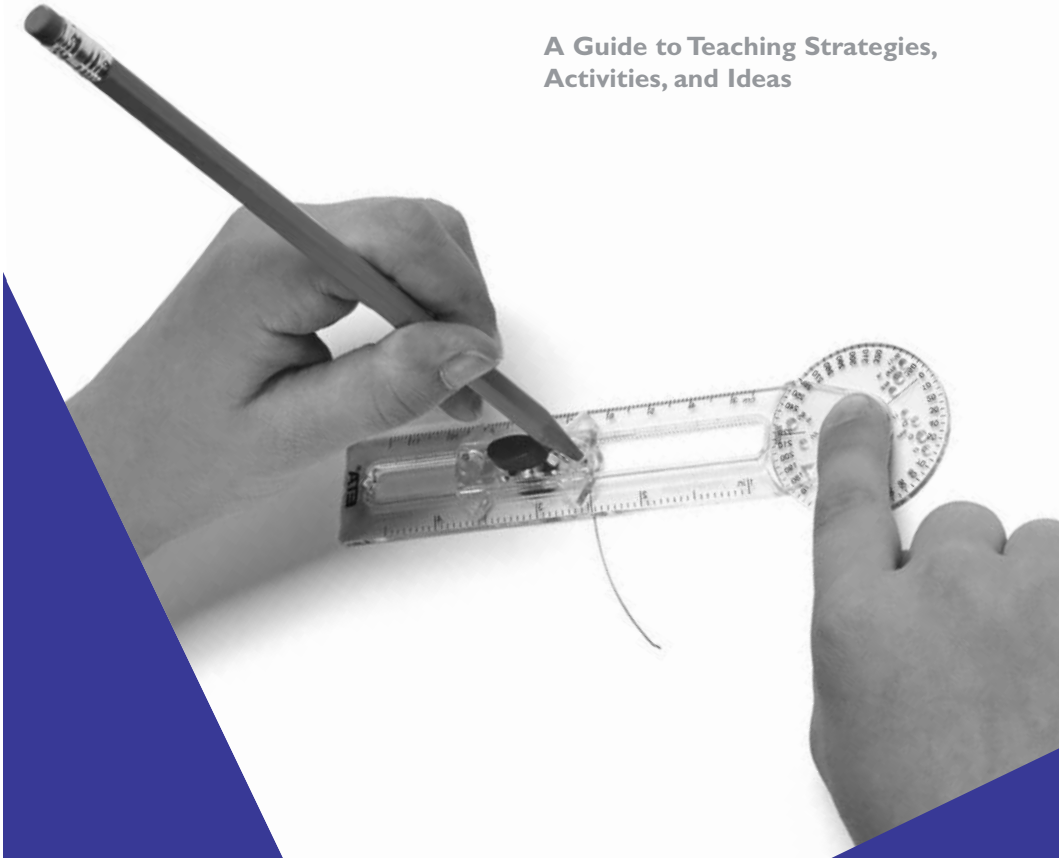
Learning About®

The GeoTool® Compass

A Guide to Teaching Strategies, Activities, and Ideas



ETA Cuisenaire

ETA 8718G

INTRODUCTION

This ***Learning About®... The GeoTool® Compass*** Activity Guide provides some basic activities that will give students an opportunity to discover, to experiment with, and to be directed toward ways of utilizing the GeoTool Compass.

The GeoTool Compass is a precision drawing instrument that can be used in a wide variety of geometry activities. It can be used to draw and measure:

Segments

Arcs

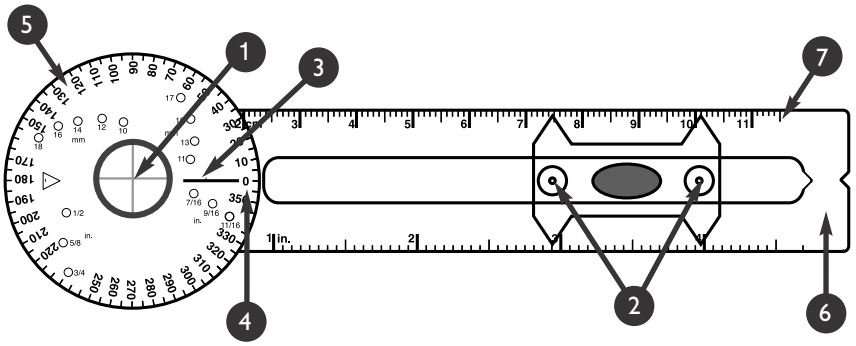
Circles

Angles

GETTING TO KNOW THE GEOTOOL COMPASS

The Parts of the GeoTool Compass

1. Center Point (Crosshairs)
2. Slide (Adjustable radius points)
3. Horizontal Mark
4. Zero Degree Mark
5. Protractor
6. Arm
7. Ruler (Dual scale)



EXPLORING CONSTRUCTIONS

In order to encourage students to experiment with the device, you may pose the question of how they may do any of the following constructions. This "discovery-based" approach give students a way to explore, as well as to devise, construction methods that may not be exactly as shown later. This type of exploration gives students an opportunity to solve problems and to practice expressing themselves mathematically as they explain how to do these constructions.

Constructions

1. Construct a line segment
2. Construct an arc
3. Construct a segment equal to a given segment
4. Construct the perpendicular bisector of a given line segment
5. Construct a line perpendicular to a given line through a point on the line
6. Construct a line perpendicular to a given line through a point not on the line
7. Construct an angle equal to a given angle
8. Construct the bisector of a given angle
9. Construct a triangle congruent to a given triangle

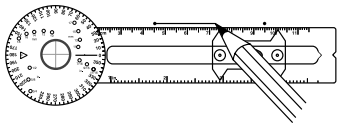
These constructions can be presented as challenges before students are shown how to do them.

CONSTRUCTIONS

These constructions should be presented after students have had the opportunity to explore and become familiar with the GeoTool Compass.

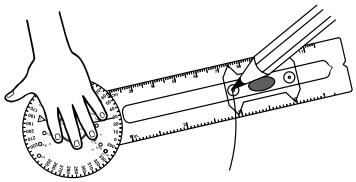
Construct a line segment

1. Draw two points on your paper.
2. Using the straight edge of the GeoTool Compass, connect the two points.



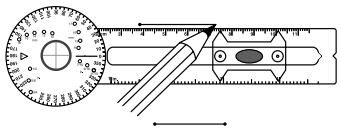
Construct an arc

1. Draw a point on your paper.
2. Place the ***center point (1)*** on the point.
3. Place your pencil in one of the holes on the ***slide (2)***.
4. Holding the ***center point*** firmly in place, move the ***arm (6)*** in either direction.

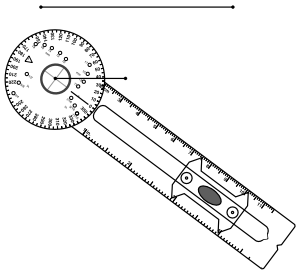


Construct a segment equal to a given segment

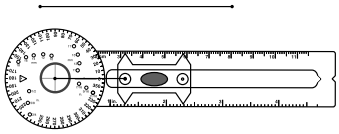
1. Draw a new line segment on your paper.



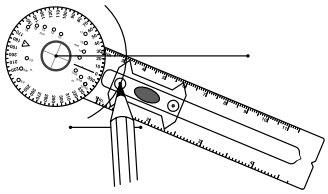
2. Place a point at each end of the new line segment.
3. Place the ***center point (1)*** on one of the endpoints of the given segment.



4. Insert your pencil onto one of the holes in the ***slide (2)*** and move it to the end of the given segment.



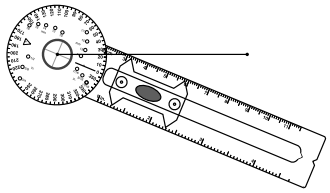
5. Tighten the ***slide***.
6. Move the GeoTool Compass back to the new segment and place the ***center point*** on the point that you made in step 2.
7. Holding the ***center point*** firmly in place, move the ***arm (6)*** in either direction.
8. Holding the ***center point*** firmly in place, move the ***arm*** to swing an arc that intersects the line segment.



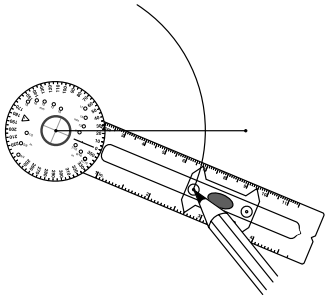
9. The resulting segment will be the same length as the given segment.

Construct the perpendicular bisector of a given line segment

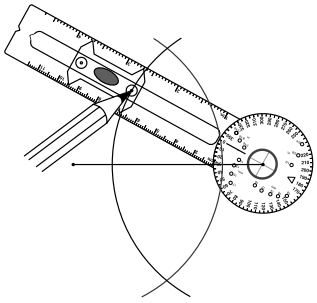
1. Place the ***center point (1)*** of your GeoTool Compass on one of the endpoints of the given segment.



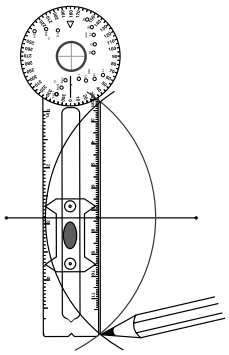
2. Move one of the holes on the ***slide (2)*** to a point more than half the length of the given segment and tighten.
3. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide*** and move the ***arm (6)*** to swing an arc above and below the segment.



4. Move the ***center point*** to the other endpoint of the given segment.
5. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide*** and move the ***arm*** to swing an arc above and below the segment.



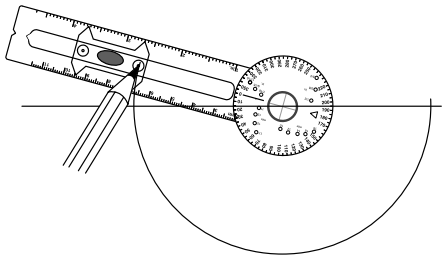
6. Using the straight edge of the GeoTool Compass, connect the points of intersection of the two arcs.



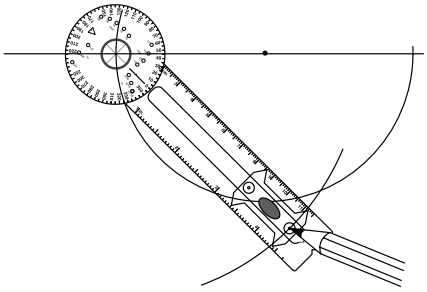
7. This line will be the perpendicular bisector of the segment.

Construct a line perpendicular to a given line through a point on the line

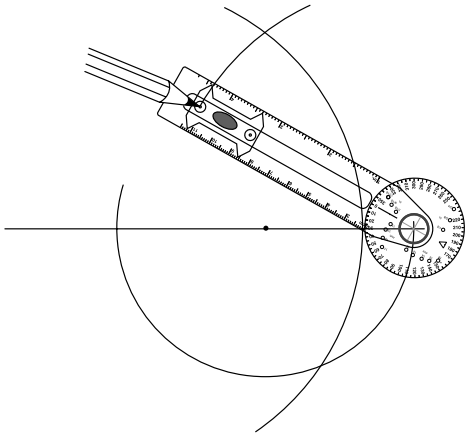
1. Place the ***center point (1)*** of your GeoTool Compass on the given point of the given segment.
2. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide (2)*** and move the ***arm (6)*** to swing an arc that intersects the line segment at two points.



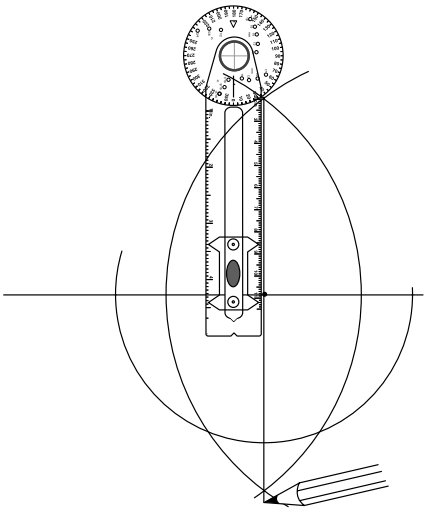
3. Place the ***center point*** on one of the points where the arc intersects the segment and extend the slide about half an inch.
4. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide***, move the ***arm***, and swing an arc above and below the segment.



5. Move the ***center point*** to the other point where the arc intersects the segment.
6. Holding the ***center point*** firmly in place, insert a pencil in the same hole in the ***slide*** and move the ***arm*** to swing an arc above and below the segment.



7. Using the straight edge of the GeoTool Compass, connect the points of intersection of the two arcs.

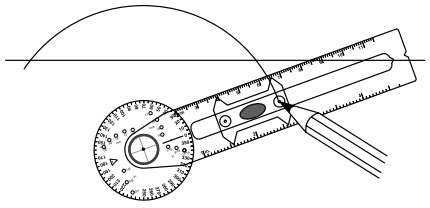


8. This line will be perpendicular to the original segment at the given point.

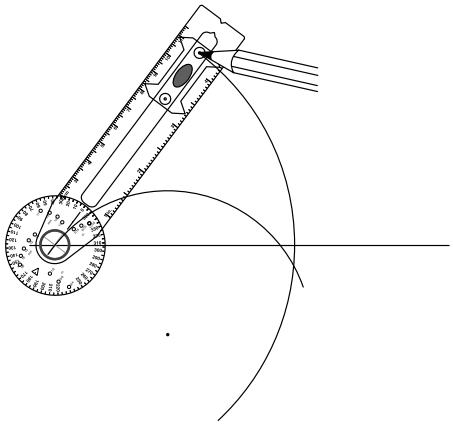
Construct a line perpendicular to a given line through a point not on the line

1. Place the ***center point (1)*** of your GeoTool Compass on the given point not on the given segment.

2. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide (2)*** and move the ***arm (6)*** to swing an arc that intersects the segment at two points.

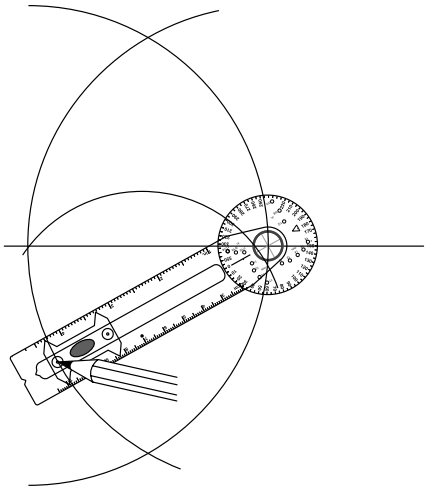


3. Place the ***center point*** on one of the points where the arc intersects the segment.
4. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide***, move the ***arm***, and swing an arc above and below the segment.

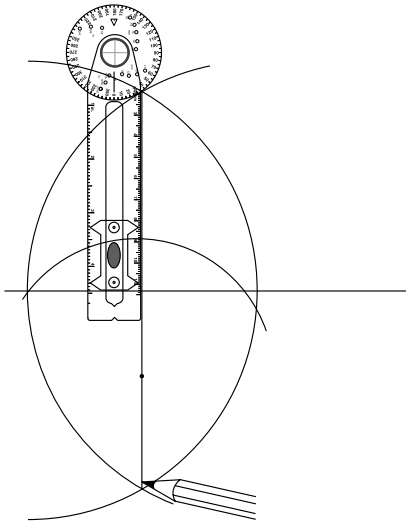


5. Move the ***center point*** to the other point where the arc intersects the segment.

6. Holding the ***center point*** firmly in place, insert a pencil in the same hole in the ***slide*** and move the ***arm*** to swing an arc above and below the segment.



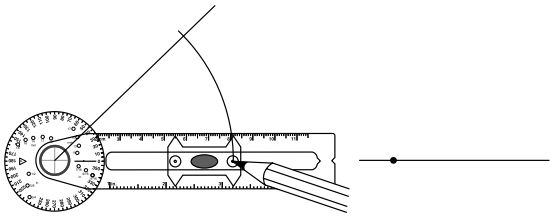
7. Using the straight edge of the GeoTool Compass, connect the points of intersection of the two sets of arcs.



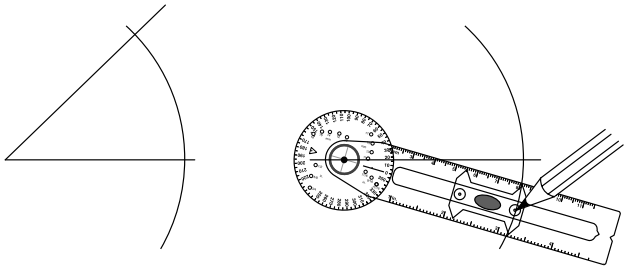
8. This line will be perpendicular to the given segment through the given point not on the segment.

Construct an angle equal to a given angle

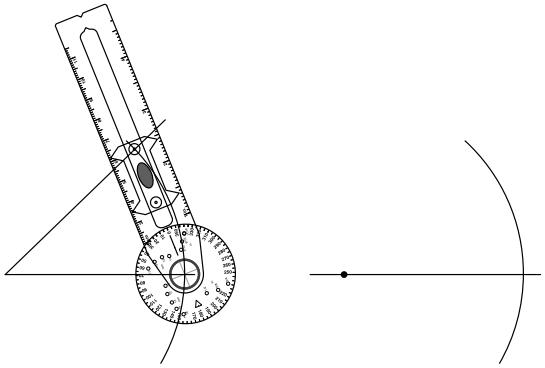
1. Draw a line segment and place a point on it.
2. Place the ***center point (1)*** on the vertex of the given angle.
3. Holding the ***center point*** firmly in place, insert a pencil in one of the holes in the ***slide (2)*** and move the ***arm (6)*** to swing an arc that intersects both sides of the angle.



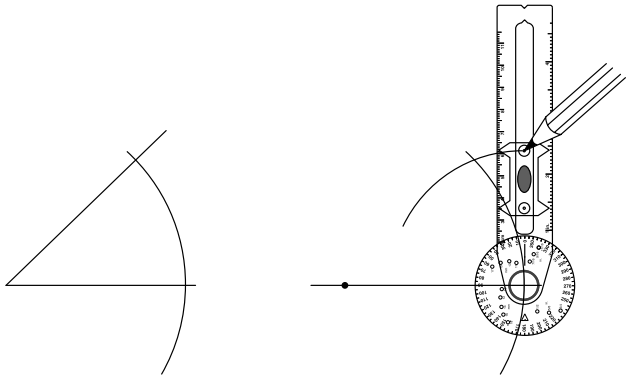
4. Keeping the radius the same, move the ***center point*** to the point on the segment drawn in step 1.
5. Holding the ***center point*** firmly in place, insert a pencil in the same hole in the ***slide*** and move the ***arm*** to swing an arc that intersects the segment drawn in step 1.



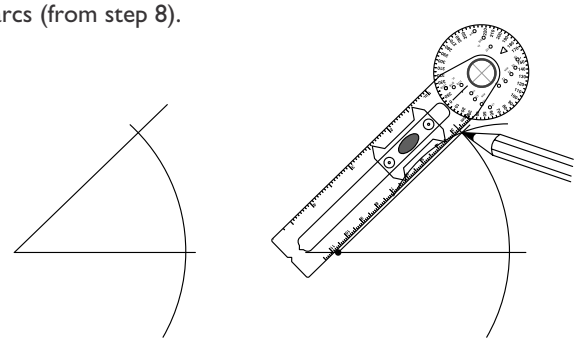
6. Place the ***center point*** on the point where the arc intersects the one side of the angle.
7. Holding the ***center point*** firmly in place, move one of the holes in the ***slide*** to the point where the arc intersects the other side of the angle and tighten the ***slide***.



8. Place the ***center point*** on the point where the arc intersects the segment drawn in step 1.



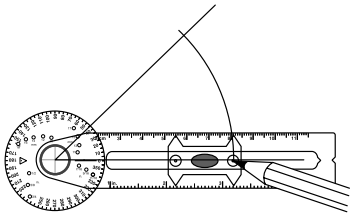
9. Draw a line segment to connect the point (from step 1) and the intersection of the two arcs (from step 8).



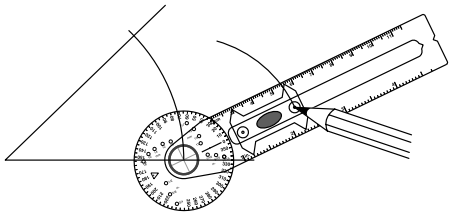
10. The resulting angle will be congruent to the given angle.

Construct the bisector of a given angle

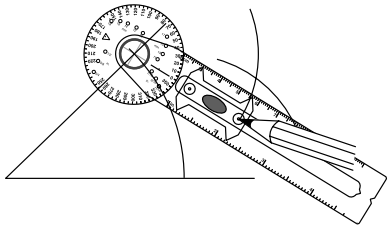
1. Place the ***center point (1)*** on the vertex of the given angle and swing any arc to intersect both sides of the angle.



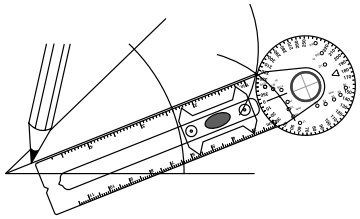
2. Place the center point on the intersection of the arc and one side of the angle and swing an arc.



3. Keeping the radius the same, repeat the procedure above using the intersection of the arc and the other side of the angle.



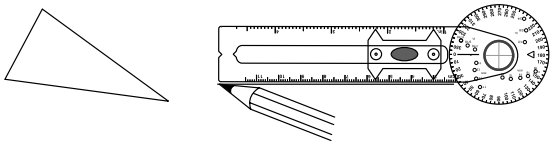
4. Connect the vertex with the point of intersection of the two arcs.



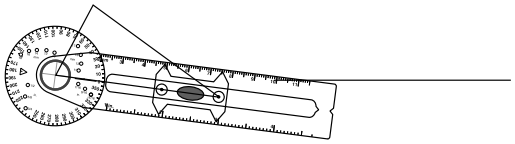
5. This line segment is the bisector of the given angle.

Construct a triangle congruent to a given triangle

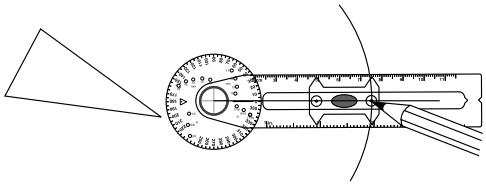
1. Draw a line segment that is longer than one side of the given triangle.



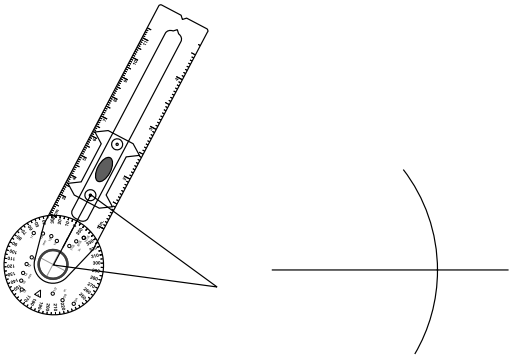
2. Place the ***center point (1)*** on the vertex of one of the angles and move the ***slide (2)*** so it coincides with the length of the side of the triangle and tighten the slide.



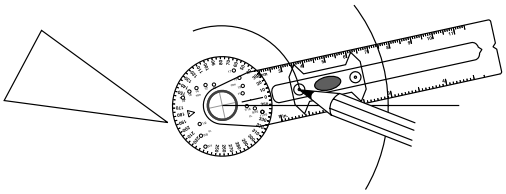
3. Place the ***center point*** on the new segment and swing an arc. This will give a segment congruent to the side of the triangle.



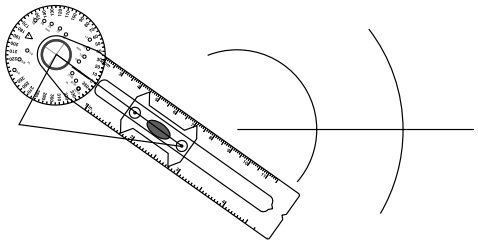
4. Measure the length of the other segment starting at the original vertex.



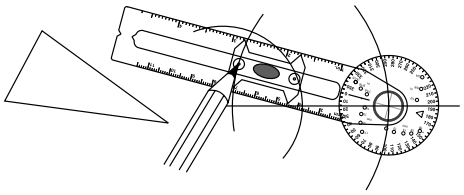
5. Place the ***center point*** back at the vertex of the new triangle and swing an arc.



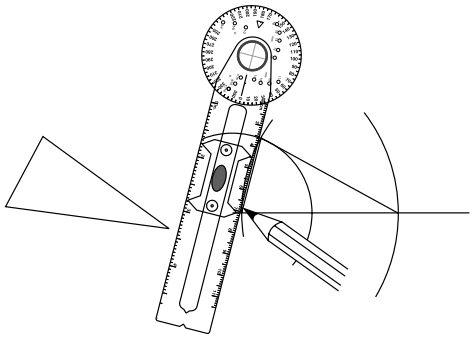
6. Place the center point on the other vertex and measure the length of the third side of the given triangle.



7. Place the ***center point*** on the other endpoint of the new segment and swing an arc.



8. Connect the endpoints of the segment and the intersection of the two arcs.



9. The resulting triangle will be congruent to the given one.

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